Journal of Paleontology, page 1 of 18

0022-3360/20/1937-2337
doi: 10.1017/jpa.2020.95

JOURNAL OF PALEONTOLOGY
A PUBLICATION OF THE Paleontological SOCIETY

New cynodonts (Therapsida, Eucynodontia) from the Late Triassic of India and their significances

Mohd Shafi Bhat,[1,2]* Sanghamitra Ray,[1] and P. M. Datta[3]

[1]Department of Geology and Geophysics, Indian Institute of Technology, Kharagpur 721302, India <shafialig@gmail.com>, <sray@gg.iitkgp.ernet.in>
[2]Current address: Department of Biological Sciences, University of Cape Town, Private Bag X3, Rhodes Gift, 7701, South Africa <shafialig@gmail.com>
[3]Greenwood Housing Cooperative Society Limited, 315B Upen Banerjee Road, Kolkata 700060, India <kunal.banerjee405@gmail.com>

Abstract.—The Upper Triassic Tiki Formation of India has yielded several new cynodont taxa, which are described on the basis of multiple isolated teeth and a jaw fragment. A new species of dromatheriid, *Rewaconodon indicus*, is defined by a tri- and tetracuspid asymmetric crown, long anterior edge of the major cusp *a*, cingular cusps *d* and *f*, and marked constriction at the crown-root junction. Another new dromatheriid, *Inditherium floris* n. gen. n. sp., is characterized by a broad, flower-shaped pentacuspid crown, multiple cingular cusps, and a weak lingual cingulum is also described from the same horizon. In addition, a new mammaliamorph taxon, *Tikiodon cromptoni* n. gen. n. sp., is established on a tooth specimen, which has a shovel-shaped crown, three closely spaced main cusps, a pronounced lingual cingulum with multiple cingular cusps, and a root of incomplete root bifurcation. Such a tooth morphology occupies an intermediate position between the non-mammalian cynodonts and the early mammals, as is evident from the co-occurrence of various cynodont dental morphotypes in the Tiki Formation. Moreover, Late Triassic cynodonts occurred along narrow belts demarcated by paleolatitudes, though the Indian fauna shows both Laurasian and Gondwanan affinities.

UUID: http://zoobank.org/c2c575ad-ee23-4f33-8a30-661c548a5b17

Introduction

Cynodontia, the therapsid group including mammals as its extant subclade (Kemp, 1982; Rubidge and Sidor, 2001; Botha et al., 2007), first appeared during the late Permian and formed a key component of the Triassic tetrapod fauna (Kemp, 1982; Battail, 2001; Abdala and Ribeiro, 2010). The non-mammalian cynodonts (sensu Abdala et al., 2020) acquired diverse modifications in dentition, jaw articulation, and basicranium prior to development of the extant mammalian clade (Kemp, 1982, 2005; Kielan-Jaworowska et al., 2004). The evolution of mammal-like features in non-mammalian cynodonts and early mammals is debated extensively (Zhou et al., 2013; Świło et al., 2014; O'Meara and Asher, 2016; Luo et al., 2017; Huttenlocker et al., 2018; Krause et al., 2020). One of the key features was the subdivision of the single-rooted postcanines into double-rooted premolars and multi-rooted molars (Rowe, 1988; Luo, 1994; Lucas et al., 2001; Shapiro and Jenkins, 2001; Sulej et al., 2020). Cynodonts experienced their first phase of diversification just before the end of the Permian. Following a decline after the Permo-Triassic Extinction, this group recovered to a peak diversity during the Middle Triassic (Anisian; Abdala and Ribeiro, 2010; Abdala and Gaetano, 2018; Lukic-Walther et al., 2019). The earliest records of cynodonts are from the late Permian (Wuchiapingian) *Tropidostoma* Assemblage Zone of South Africa, these include *Charassognathus* (Botha et al., 2007) and *Abdalodon* (Kammerer, 2016). Other Gondwanan records are from southern Brazil (Martinelli et al., 2005, 2016, 2017; Soares et al., 2014), Argentina (Martinelli et al., 2016; Fiorelli et al., 2018), South Africa (Sidor and Hancox, 2006), and India (Chatterjee, 1982; Datta et al., 2004; Ray, 2015). Non-mammalian cynodonts are also known from the Late Triassic of Laurasian landmasses, which in today's geography include such regions and countries as Greenland (Shapiro and Jenkins, 2001), the United States (Lucas and Oakes, 1988; Sues et al., 1994; Liu and Olsen, 2010; Liu and Sues, 2010; Heckert et al., 2012), Germany (Lucas et al., 2001), Poland (Świło et al., 2014; Sulej et al., 2020), and several continental European countries.

Non-mammalian cynodonts are known from the Triassic sediments of the various Gondwana basins of India (Fig. 1.1, 1.2). These included *Thrinaxodon bengalensis* Satsangi, 1987 (Bandyopadhyay, 2011) and *Panchetocynodon damodarensis* Das and Gupta, 2012 from the Lower Triassic Panchet Formation of the Damodar Basin, and indeterminate trirachodontid teeth from the Middle Triassic Yerrapalli Formation of the Pranhita-Godavari Basin (Bandyopadhyay and Sengupta, 1999, 2006; Bandyopadhyay and Ray, 2020). The Late Triassic is represented by the traversodontid *Exaeretodon statisticae* Chatterjee, 1982 and isolated postcanine teeth of the chiniquodontid *Deccanodon maleriensis* Nath and Yadagiri, 2007 from the lower part of the Maleri Formation (Chatterjee, 1982; Nath and Yadagiri, 2007), and sectorial teeth of the dromatheriid

*Corresponding author.